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(54) Disposable pull-on diaper

(57) A disposable pull-on diaper 1 includes a liquid absorbent core 2, and the core 2 is joined to a topsheet 3 in front and rear waist regions 6, 7 as well as in a crotch region 8 but not joined to a backsheet 4 in the front and rear waist regions 6, 7. The topsheet 3 and the backsheet 4 are not joined to each other in their portions extending between longitudinally opposite ends of the liquid-absorbent core 2 and a peripheral edge 17 of a waist-opening 11. The diaper thus constructed prevents the core from being flexed or crooked.

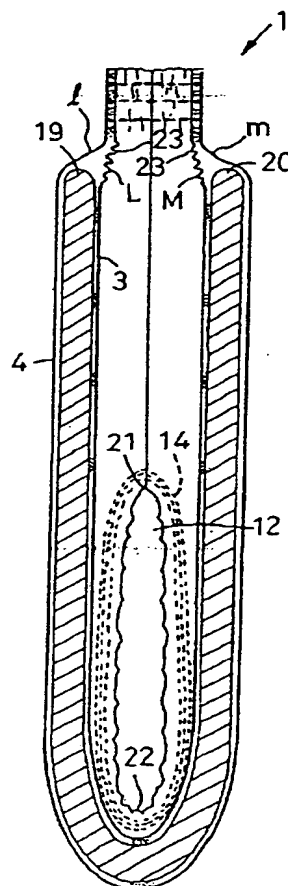


FIG. 2B

## Description

[0001] This invention relates to a disposable pull-on diaper for absorption and containment of bodily wastes.

[0002] A disposable pull-on diaper is well known, which comprises a liquid-pervious topsheet, a liquid-imperious backsheet and a liquid-absorbent core disposed between these two sheets. These components are assembled together to form a waist-opening and a pair of leg-openings. Fig. 4 in the accompanying drawings is a sectional view showing an example of such well-known diaper. As shown, front and rear waist regions 106, 107 of a diaper 100 are put flat together and joined to each other along their respective side edges so as to form a waist-opening 111 and a pair of leg-openings 112, thereby to present a pants-like or brief configuration. Both the waist-opening 111 and the leg-openings 112 are provided along their peripheral edges with elastic members 113, 114, respectively, extending circumferentially and secured under appropriate tension thereto. Fig. 5 is a view similar to Fig. 4, showing the same well-known diaper as the elastic members 113, 114 have contracted. Referring now to Figs. 4 and 5, movements of the diaper components before and after the elastic members 114 for the leg-opening have contracted will be described with respect to the uppermost point 121 of the leg-opening 112. As will be apparent from this comparison, contraction of the members 114 causes a crotch region 108 of the diaper 100 to move upward together with a liquid-absorbent core 102. However, topsheet 103 and the backsheet 104 are joined to each other by means of hot melt adhesive 116A provided immediately above front and rear ends 119, 120 of the liquid-absorbent core 102. Such arrangement disadvantageously restricts the liquid-absorbent core 102 against freely moving upward and, in consequence, forcibly crook the liquid-absorbent core 102 as seen in Fig. 5.

[0003] Once such crookedness occurring in the liquid-absorbent core has become permanent, a gap is left due to the permanent crookedness between the diaper put on the wearer's body and the wearer's skin. Such gap makes it difficult for the liquid-absorbent core to absorb body fluids discharged on the diaper as rapidly as possible. Furthermore, the crookedness of the liquid-absorbent core increases an apparent thickness of the diaper and makes the packaged diaper inconveniently bulky.

[0004] It is an object of the present invention to provide a disposable pull-on diaper allowing a liquid-absorbent core to be free from crookedness or deformation with which the disposable diaper has usually been accompanied.

[0005] According to the present invention, there is provided a disposable pull-on diaper having a front region, a rear region and a crotch region therebetween, the diaper comprising a liquid-absorbent core, a topsheet overlying the liquid-absorbent core and a back-

sheet underlying the liquid-absorbent core, the liquid-absorbent core extending across the crotch region into the front and rear waist regions, the front and rear waist region being joined to each other along side edges thereof to form a waist-opening and a pair of leg-openings; the waist-region and the leg-openings being provided with elastic members secured under tension thereto and extending circumferentially along peripheral edges of the respective openings; and the topsheet and the backsheet being joined to each other along the peripheral edges of the respective openings.

[0006] In such disposable pull-on diaper, the present invention is characterized by that the liquid-absorbent core has front and rear ends adjacent outer ends of the front and rear waist regions, respectively, defining together the peripheral edge of the waist-opening so that the liquid-absorbent core is put restraint upon its a movement thereof relative to the topsheet in the front and rear waist regions as well as in the crotch region but freely movable relative to the backsheet at least in the front and rear waist regions; and the topsheet and the backsheet are not joined to each other at portions thereof extending outward beyond the front and rear ends of the liquid-absorbent core to the peripheral edge of the waist-opening.

[0007] According to one embodiment of the present invention, a portion of the topsheet extending outward beyond any one of the front and rear ends of the liquid-absorbent core to the peripheral edge of the waist-opening is tucked between the liquid-absorbent core and the backsheet.

Fig. 1 is a perspective view showing an embodiment of a partly cutaway diaper according to the present invention;

Fig. 2 is a sectional view taken along a line II-II in Fig. 1, showing the diaper with elastic members for leg-openings being in a stretched state (A) and with the elastic members being in a contracted state (B); Fig. 3 is a fragmentary sectional view showing important parts in an alternative embodiment of the diaper according to the present invention;

Fig. 4 is a view similar to Fig. 2 showing the diaper of prior art with the elastic members for the leg-openings being in a stretched state; and

Fig. 5 is a view similar to Fig. 4 showing the diaper of prior art with the elastic members for the leg-openings being in a contracted state.

[0008] Details of a disposable pull-on diaper according to the present invention will be more fully understood from the description given hereunder with reference to the accompanying drawings.

[0009] A disposable pull-on diaper 1 shown by Fig. 1 in a plan view as partially broken away comprises an absorbent core 2, a topsheet 3 overlying the absorbent core 2 and a backsheet 4 underlying the absorbent core 2. The diaper 1 has a front waist region 6 to cover the

wearer's belly, a rear waist region 7 to cover the wearer's back and a crotch region 8 extending between these front and rear waist regions 6, 7 to cover the wearer's crotch. The front and rear waist regions 6, 7 are put flat together along respective pairs of their opposite side edges which are, in turn, joined together by means of adhesive spots intermittently arranged in their vertical directions so as to form a waist-opening 11 and a pair of leg-openings 12. The respective openings 11, 12 are provided along their peripheries with elastic member 13 for the waist-opening 11 and elastic members 14 for the leg-openings 12. These elastic members 13, 14 circumferentially extend between the topsheet 3 and the backsheet 4 and are secured under appropriate tension to the inner surface of at least one of these sheets 3, 4 by means of hot melt adhesive 16.

**[0010]** Fig. 2 is a sectional view taken along a center line II-II (See Fig. 1) bisecting a width of the diaper 1, showing the diaper 1 with both the elastic member 13 for the waist-opening and the elastic members 14 being in a stretched state as they are in Fig. 1 (A) and with these elastic members 13, 14 being in a contracted state (B).

**[0011]** As will be apparent from Fig. 2 (A), the absorbent core 2 and the topsheet 3 are intermittently joined to each other by means of hot melt adhesive 16 arranged in the front and rear waist regions 6, 7 as well as in the crotch region 8 so that the absorbent core 2 has a movement thereof relative to the topsheet 3 restricted by the hot melt adhesive 16. On the other hand, the absorbent core 2 is movable relatively to the backsheet 4 in the front and rear waist regions 6, 7 because the absorbent core 2 and the backsheet 4 are not joined to each other in these front and rear waist regions 6, 7. However, it should be understood that, in the crotch region 8, the absorbent core 2 and the backsheet 4 may be or not joined to each other. According to the embodiment shown in Fig. 2, the absorbent core 2 and the backsheet 4 are joined to each other by means of hot melt adhesive 16 at the bottom of the crotch region 8. The topsheet 3 and the backsheet 4 are joined to each other by means of hot melt adhesive 16 along a peripheral edge 17 of the waist-opening 11. The peripheral edge 17 corresponds to a zone in which the elastic member 13 for the waist-opening 11 is secured to at least one of the topsheet 3 and the backsheet 4. The topsheet 3 and the backsheets 4 are not joined to each other in zones L, I, M, m defined between the lowermost level 18 of the peripheral edge 17 along which the topsheet 3 and the backsheet 4 are joined to each other and longitudinally opposite ends, i.e., front and rear ends 19, 20 of the absorbent core 2 so that these two sheets 3, 4 are free from each other in these zones. A total dimension of zones L, I, M, m is in a range of 10 - 150 mm, preferably 20 - 130 mm and more preferably 30 - 110 mm. It will be obviously understood that, along the substantially entire side edges of the topsheet 3 and the backsheet 4 and the zones in the vicinity of these

side edges, the topsheet 3 and the backsheet 4 are joined to each other at the spots 9 intermittently arranged in their vertical directions or continuously joined to each other.

**[0012]** As will be apparent from Fig. 2(B), contraction of the elastic members 14 for the leg-openings 14 causes the lowermost portions 22 of the respective openings 12 to be lifted together with portions of the absorbent core 2 and the topsheet 3 and the backsheet 4 lying adjacent the lower most portions 22. Thereupon, the front and rear ends 19, 20 of the absorbent core 2 are also lifted and, in consequence, the zones L, M of the topsheet 3 are formed with fine gathers while the backsheet 4 slightly slackens in its vertical direction. In this manner, the absorbent core 2 is free from any crookedness or the other deformation during its upward movement since none of factors obstruct the absorbent core 4 against its upward movement.

**[0013]** Fig. 3 is a view similar to Fig. 2(A), showing, in enlarged scale, the important part corresponding to that as shown in Fig. 2(A) but modified according to an alternative embodiment of the present invention. According to the present embodiment, the portion L of the topsheet 3 extending between the lowermost level 18 of the waist-opening's peripheral edge 17 and the front end 19 of the absorbent core 2 is tucked between the absorbent core 2 and the backsheet 4, forming a pleat 26. The pleat 26 is bonded neither to the absorbent core 2 nor to the backsheet 4 so that the pleat 26 may be extended as the absorbent core 2 moved upward. Therefore nothing obstructs the upward movement of the absorbent core 2. Such embodiment is preferably adopted when a distance D between the lowermost level 18 of the peripheral edge 17 and the front end 19 of the absorbent core 2 is limited, for example, to a range of 0 - 30 mm. It should be understood that the portion L of the topsheet 3 (See Fig. 2) extending between the lowermost level 18 of the waist-opening's peripheral edge 17 and the front end 19 of the absorbent core 2 includes the pleat 26 extending from the lowermost level 18 to the front end 19. Such pleat 26 may be formed in the rear waist region 7 also.

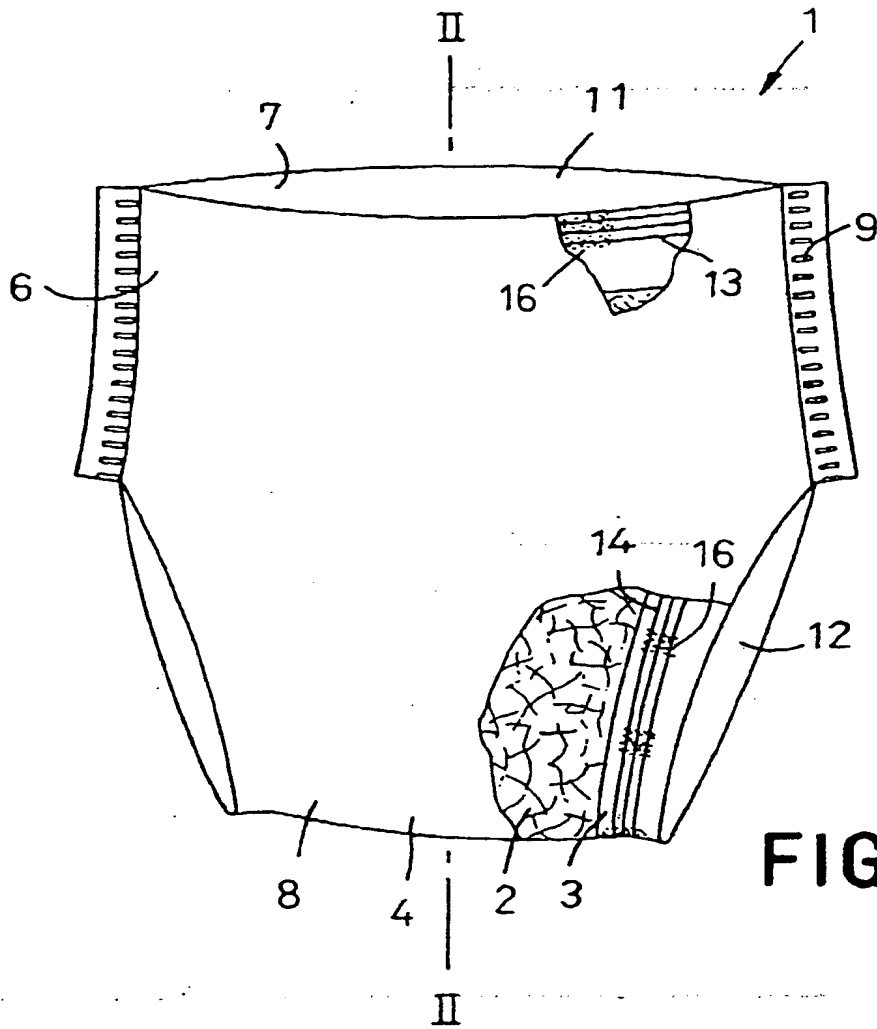
**[0014]** To exploit the present invention, the topsheet 3 may comprise a liquid-pervious sheet as its portion destined to cover at least the absorbent core 2 and a substantially liquid-impervious sheet as its portion destined to extend outward beyond a peripheral edge of the absorbent core 2. As stock material for the backsheet 4, a liquid-impervious or substantially liquid-impervious sheet may be used. The liquid-pervious sheet may be selected from a group consisting of a nonwoven fabric, an aperture plastic film etc., and the liquid-impervious sheet may be selected from a group consisting of a plastic film, etc.

**[0015]** With the disposable pull-on diaper according to the present invention, contraction of as elastic members for the leg-openings causes the absorbent core to be freely moved upward without any crookedness of the

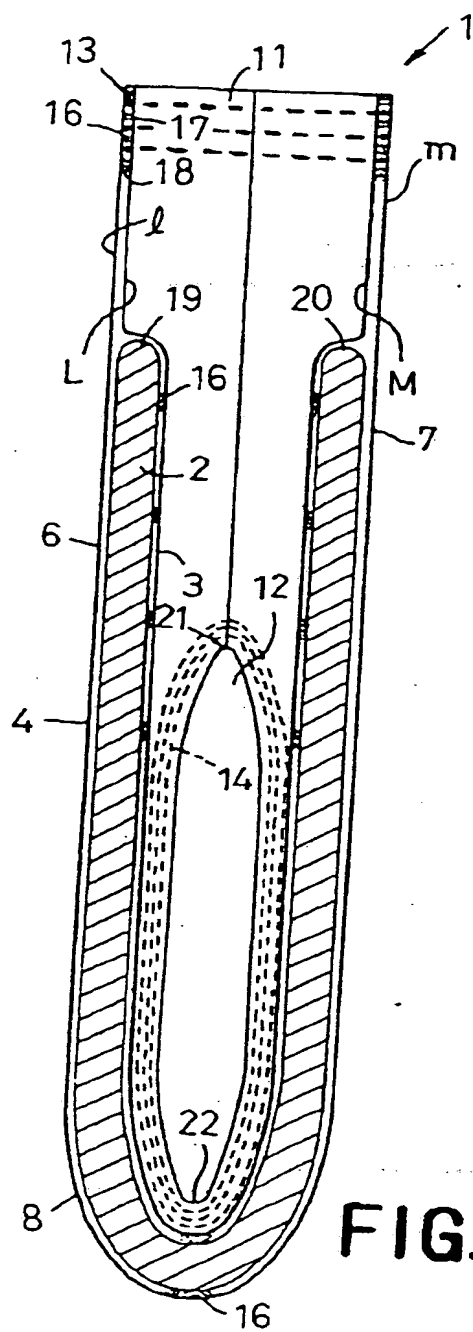
absorbent core as the diaper of prior art has usually been the case. Accordingly, the absorbent core according to the present invention has no permanent crookedness formed thereon. Such absorbent core is substantially flat and allows the diaper to be compactly packaged. In addition, such absorbent core having no permanent crookedness or deformation contributes to improvement of the diaper's fitting to the wearer's body.

## Claims

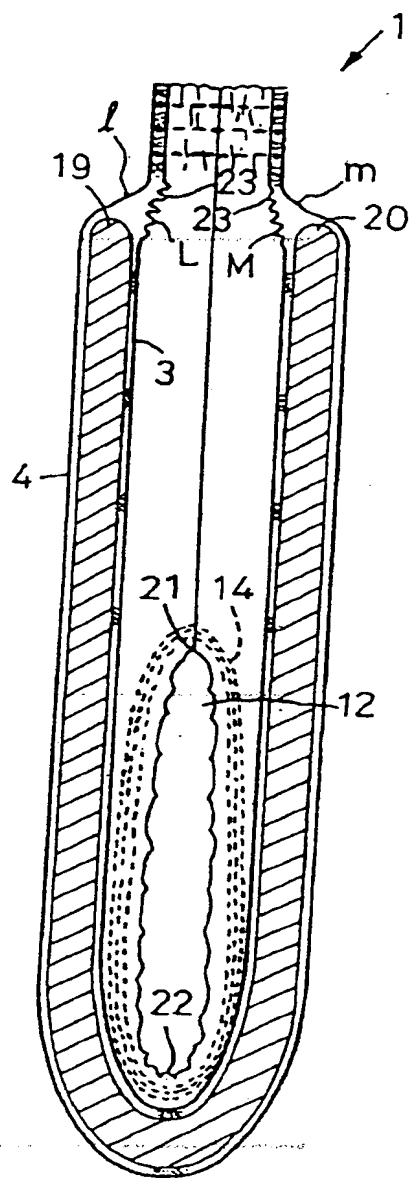
1. A disposable pull-on diaper having a front region, a rear region and a crotch region therebetween, said diaper comprising a liquid-absorbent core, a topsheet overlying said liquid-absorbent core and a backsheet underlying said liquid-absorbent core, said liquid-absorbent core extending across said crotch region into said front and rear waist regions, said front and rear waist regions being joined to each other along side edges thereof to form a waist-opening and a pair of leg-openings; said waist-opening and leg-openings being provided with elastic members secured under tension thereto and extending circumferentially along peripheral edges of said respective openings; and said topsheet and said backsheet being joined to each other along said peripheral edges of said respective openings, wherein:
  - said liquid-absorbent core has front and rear ends adjacent outer ends of said front and rear waist regions, respectively, defining together said peripheral edge of said waist-opening so that said liquid-absorbent core is put restraint upon a movement thereof relative to said topsheet in said front and rear waist regions as well as in said crotch region but freely movable relative to said backsheet at least in said front and rear waist regions; and
  - said topsheet and said backsheet are not joined to each other at portions thereof extending outward beyond said front and rear ends of said liquid-absorbent core to said peripheral edge of said waist-opening.
2. The diaper according to Claim 1, wherein a portion of said topsheet extending outward beyond any one of said front and rear ends of said liquid-absorbent core to said peripheral edge of said waist-opening is tucked between said liquid-absorbent core and said backsheet.



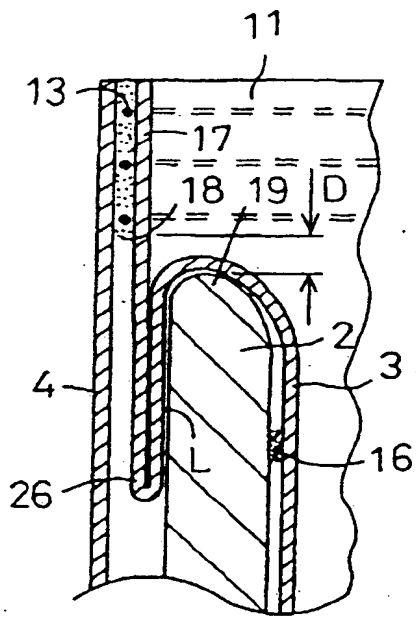
**FIG. 1**



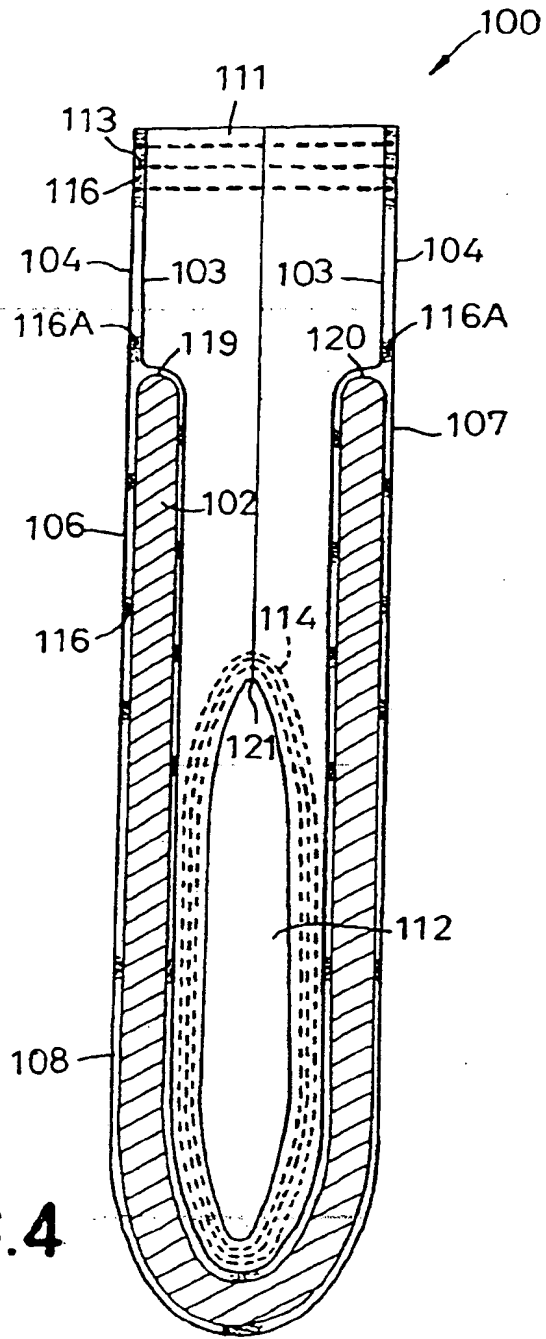
**FIG.2A**



**FIG. 2B**

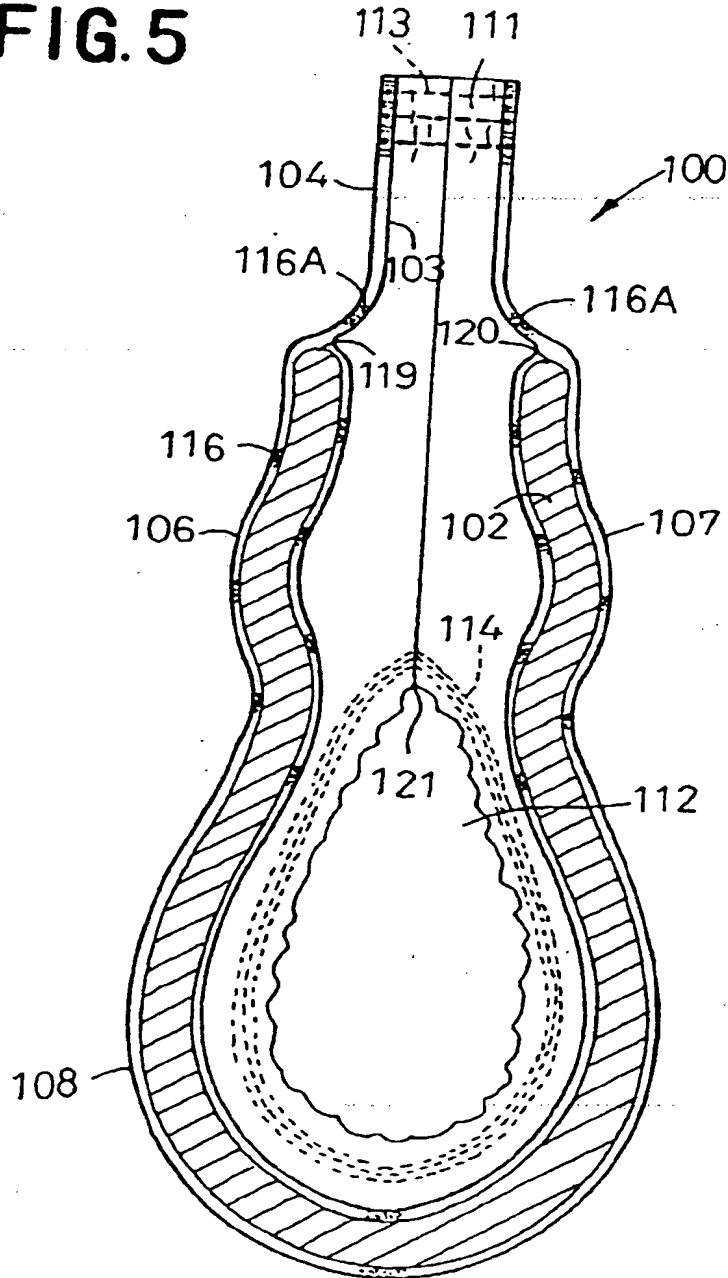


**FIG. 3**



**FIG. 4**

**FIG. 5**





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(54) Disposable pull-on diaper

(57) A disposable pull-on diaper 1 includes a liquid absorbent core 2, and the core 2 is joined to a topsheet 3 in front and rear waist regions 6, 7 as well as in a crotch region 8 but not joined to a backsheet 4 in the front and rear waist regions 6, 7. The topsheet 3 and the backsheet 4 are not joined to each other in their portions extending between longitudinally opposite ends of the liquid-absorbent core 2 and a peripheral edge 17 of a waist-opening 11. The diaper thus constructed prevents the core from being flexed or crooked.

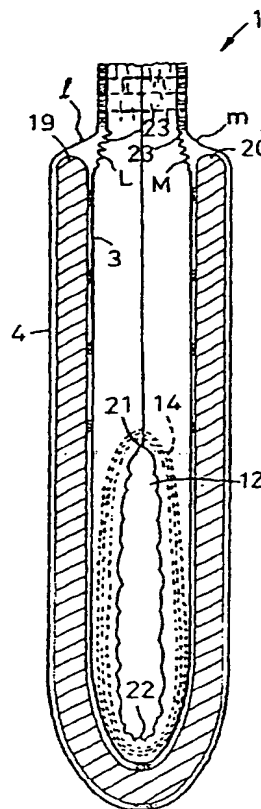


FIG. 2B



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Application Number  
EP 99 30 7751

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-/--			
The present search report has been drawn up for all claims			
Place of search <b>THE HAGUE</b>		Date of completion of the search <b>13 February 2001</b>	Examiner <b>Seabra, L</b>
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone  Y : particularly relevant if combined with another document of the same category  A : technological background  O : non-written disclosure  P : intermediate document</p> <p>1 : theory or principle underlying the invention  E : earlier patent document, but published on, or after the filing date  D : document cited in the application  L : document cited for other reasons</p> <p>&amp; : member of the same patent family, corresponding document</p>			



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Place of search: <b>THE HAGUE</b>		Date of completion of the search: <b>13 February 2001</b>	Examiner: <b>Seabra, L</b>
<p><b>CATEGORY OF CITED DOCUMENTS</b></p> <p>X : particularly relevant if taken alone  Y : particularly relevant if combined with another document of the same category  A : technological background  O : non-written disclosure  P : intermediate document</p> <p>T : theory or principle underlying the invention  E : earlier patent document, but published on, or after the filing date  D : document cited in the application  I : document cited for other reasons  &amp; : member of the same patent family, corresponding document</p>			

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